THE USE OF INHOUSE RESOURCES BY A MUNICIPALITY TO CONDUCT A DETAILED WATERSHED ASSESSMENT

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Abstract. Cobb County's R. L. Sutton WRF is located in southeast Cobb County and discharges into the Chattahoochee River. The plant is currently designed to treat an average daily flow of 40 mgd. The Cobb County Water System (CCWS) is procuring engineering services for the design of a 60 mgd plant that will replace the wet process units in the existing 40 mgd plant. The EPD informed the CCWS that a watershed study of the treatment basin must be completed before the documents for the construction of the 60 mgd plant will be approved.

CCWS reviewed the criteria for the study and found that they possess the resources to conduct the research in-house utilizing resources in their Engineering Division and Water Quality Laboratory. Study design land use and watershed information is being provided by CCWS Engineering. Sampling is being performed by the laboratory. This involves both wet weather sampling as well as dry weather sampling and macroinvertebrate studies. Habitat assessments will also be conducted as part of the macroinvertebrate study.

INTRODUCTION

Cobb County has been monitoring streams since the early seventies. This monitoring mainly involved chemical sampling. Since 1987, the county has been continually upgrading the program. We now produce an annual report with detailed site descriptions and chemical data along with some biological data. This provides the county with vast amounts of historical data. Where possible, study sites for the basin study were chosen from already existing sites. New sites were determined from county land use and drainage maps.

Twelve sampling stations and one reference station have been identified for this study. Water quality measurements will be collected at all stations. Benthic macroinvertebrates will be collected at ten stations and fish at seven stations. Benthic macroinvertebrates and fish will be collected from the reference station. Table 1 summarizes the reasons for selecting the station locations and the types of sampling that will be conducted at each site.

STUDY SITES

The study area is located in eastern Cobb County. The sampling stations have been located on stream sections that drain areas that represent land uses typically found in the study area. This will help evaluate effects of non-point source impacts on water quality as it relates to land use commonly found in the watershed. This information will aid in addressing solutions to water quality problems created by both present and projected land use. The sampling stations represent three subbasins in the watershed: Sope Creek, Rottenwood Creek and Vinings. A reference station has also been chosen in Carroll County. The stream, a tributary of Snake Creek, is located at Wayside Road.

A reference site has been chosen in Carroll County. Reconnaissance sampling reveled a diverse population of macroinvertebrates containing many sensitive species. The site possesses good diversity with all major habitat types well represented. The reference station will provide a baseline for the study as it is located in a relatively undeveloped area with little influence from non-point source pollution.

CHEMICAL MONITORING

The laboratory will coordinate and supervise all wet and dry weather sampling. The CCWS lab is capable of analyzing many water quality parameters in-house. Most of these parameters are tested as part of the NPDES permit analysis. The CCWS also has an extensive qa/qc program in place for both analysis and sampling. Samples can be run the day of collection if necessary due to the convenient location of the laboratory.

Water quality sampling will include wet weather and dry weather sampling. Biological sites will be sampled for chemical parameters when biological sampling is conducted. An automatic sampler located at the USGS Lower Roswell Road flow gauging and research station will be utilized to collect samples during rain events. The sampler will collect discrete hourly samples during high and normal flows. Water quality parameters are listed in table 2.

The U. S. Geological Survey (USGS) has been contracted and is providing information on the hydrologic data gathered

from their gauging station at Sope Creek on Lower Roswell Road. This site is part of their NAWQA study and a wealth of historical data has been accumulated. CCWS and the USGS will share data gathered from this station. CCWS is cooperating in sample collection from rain events at the site. Cobb County personnel have been familiarized with USGS sample collection methods.

MACROINVERTEBRATE STUDIES

Macroinvertebrate studies will be conducted using the State of Georgia SOP For Fresh Water Macroinvertebrate Assessment. CCWS is using Rapid Bioassessment Protocol III (RBP III). This is the most thorough of the assessment procedures. North Carolina SOP along with the EPA Rapid Bioassessment Protocol were consulted. CCWS stream monitoring personnel have been studying these manuals and have received biological training from EPD, CH2M Hill and Berry A. Vittor and Associates, Inc. Sampling and elutriation will be done in the field by stream monitoring personnel. Each habitat will be evaluated separately for more accurate site comparisons. Sorting will also be done by CCWS personnel. An intern has been hired to assist in this process. Taxonomy for most families and some genus level identification will be conducted in-house. Specimens will be sent to a taxonomist for quality control of CCWS taxonomic determinations. All specimens sent out will be identified to lowest taxa level possible, preferably species. Chironomids will be sorted to family and sent to taxonomist for further identification. A voucher collection will be constructed from all specimens collected in this study.

FISH SAMPLING

CH2M Hill is being contracted to conduct the fish sampling. CCWS stream monitoring personnel will assist in the sampling and receive training. The RBP V method will be followed for fish sampling; electrofishing will be the primary technique used to collect specimens (Plafkin et al., 1989). A voucher collection will be turned over to CCWS for taxonomic reference.

EVALUATION OF BIOLOGICAL DATA

The RBP 3 and RBP 5 (Plafkin et al., 1989) and Ga DNR methods provide metric parameters for analyzing the physical, habitat, chemical and biological data. Other metrics that will be used for data analysis are published in the North Carolina Division of Environmental Management (DEM) SOP Manual for Biological Monitoring. Of particular importance is the biological index (BI) associated tolerance values, along with the EPT index developed by North Carolina for invertebrates indigenous to pediment streams such as the tributaries of the Chattahoochee River. These indexes will provide a more accurate interpretation of the relative water quality than the Hilsenhoff indices, which are based on data from Midwestern streams.

The Index of Biotic Integrity (Plafkin et al., 1989) will used for fish evaluation. Using an array of metrics to comparatively analyze data is essential to document differences amongst stations.

Habitat assessments will be conducted at all biological sites using the protocol provided in the Georgia SOP For Fresh Water Macroinvertebrate Assessment.

ANALYSIS OF CHEMICAL DATA

Data evaluation will focus on a direct comparison of the chemical data from each station. CCWS personnal will evaluate all chemical data generated by this study. Chemical data will also be made available to the USGS for evaluation.

MODELING

A water quality model will be used for this study. The results obtained from these coefficients for the majority of the Sope Creek subbasin will be compared to measured loadings. The current loading in Sope Creek will be measured using the United States Geological Survey (USGS) stream gauge located on the downstream side of the bridge at Lower Roswell Road. Hourly discrete samples will be collected in wet weather conditions using an automatic sampler. Loadings will be calculated from hourly concentrations and flow data. Available export coefficients will be evaluated as a part of this analysis and adjusted as appropriate to match collected data. The refined coefficients will be combined with future land use information for analysis of future loading conditions.

Current and future loadings for the R. L. Sutton WRF service area will be estimated. The non-point source loadings will be calculated using land use data and export coefficients for each land use category. Current land use will be obtained from 1995 ARC land use data. Information from Cobb County and Fulton County planning and development departments will be evaluated from the future land use analysis. Population projections will be evaluated from future land use analysis. Available population projections will also be considered. The current and future point source loadings will be calculated using NPDES discharge monitoring reports from January 1998 to December 1998.

Based on the findings of the biological study and the loadings analysis, recommendations will be formulated for watershed protection and improvement of water quality. If analysis determines that non-point source controls are necessary, the specific best management practices (BMPs) will be investigated and the level of pollution reduction expected

Table 1. Station Sampling and Selection Rationale.		
Station	**Type of Sampling**	**Selection Rationale**
1	Benthos & Chemical	Non-point source test station on upper Sewell Mill Creek.
2	Benthos, Fish, & Chemical	Non-point source test station on lower Sewell Mill Creek.
3	Benthos & Chemical	Non-point source test station on upper Sope Creek.
4	Benthos, Fish, & Chemical	Non-point source test station on Sope Creek before Sewell Mill Creek confluence.
5	Benthos, Fish, & Chemical	Non-point source test station on Sope Creek after Sewell Mill Creek confluence.
6	Benthos & Chemical	Non-point source test station on Rottenwood Creek just downstream of the City of Marietta.
7	Benthos, Fish, & Chemical	Non-point source test station on Rottenwood Creek downstream of Marietta and Lockheed.
8	Benthos, Fish, & Chemical	Non-point source test station on Popular Creek downstream of the City of Smyrna.
9	Benthos, Fish, & Chemical	Non-point source test station on lower Rottenwood Creek.
10	Benthos, Fish, & Chemical	Non-point source test station on lower Little Nancy Creek.
11	Chemical	Water quality test station on Poorhouse Creek downstream of Lockheed and highly developed area (with truck and auto repair businesses).
12	Chemical	Water quality test station on Little Nancy Creek to determine if the lakes in this basin improve water quality.
13	Benthos, Fish, & Chemical	Reference station.

Table 2. Analytical Parameters.							
Parameter	Wet Weather Grab Samples	Sope Creek Discrete Samples	Samples Collected During Biological Sampling	**Parameter**	Wet Weather Grab Samples	Sope Creek Discrete Samples	Samples Collected During Biological Sampling
Time	✔	✔	✔	**Total Reactive Phosphorus**	✔	✔	
Temperature	✔		✔	**T.K.N.**	✔	✔	
D.O.	✔		✔	**Nitrate/Nitrite**	✔	✔	
pH	✔		✔	**Fecal Coliform**	✔	✔	
Conductivity			✔	**Cadmium**	✔	✔	
B.O.D.	✔	✔		**Copper**	✔		
C.O.D.	✔			**Lead**	✔	✔	
T.S.S.	✔	✔		**Zinc**	✔	✔	
T.D.S.	✔	✔			✔	✔	
Turbidity	✔		✔		✔	✔	
Ammonia	✔	✔					
Total Phosphorus	✔	✔					

from each BMP will be determined. If point source controls are required to meet water quality goals, then strategies for reducing point source pollution will be developed. Since Cobb County personnel are actively involved in the study, we will possess more insight into data analysis than would otherwise be possible. Information gained from this study can be integrated with existing monitoring programs such as the stream monitoring program to further strengthen our knowledge of problems facing not only the study basins but all of Cobb County's surface waters. Communication lines between the CCWS Engineering Division, the CCWS Water Quality Laboratory, and the USGS, as well as other governmental agencies, will provide even more information. This cooperation in data collection and analysis can also translate into substantive problem solving when confronting the problems facing urban watersheds. This would not be possible if the county took a passive attitude toward watershed assessment.

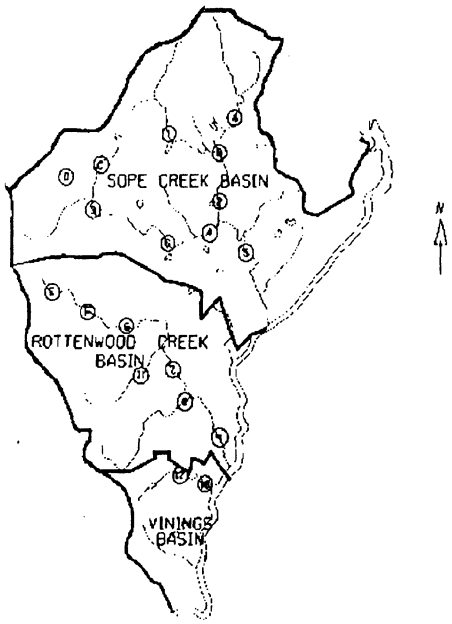

Figure 1. Cobb County sampling stations.

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